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EXAMINER

LIN, WEN TAI

ART UNIT	PAPER NUMBER
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2154

DATE MAILED: 06/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/873,977

Applicant(s)

MCCABE ET AL.

Examiner

Wen-Tai Lin

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 April 2005.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
4a) Of the above claim(s) 1-3, 12-16, 25-28, 32-34 and 38-41 is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 4-11, 17-24, 29-31, 35-37 and 42-44 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 02 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 8/13/01, 9/24/01.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 4-11, 17-24, 29-31, 35-37 and 42-44 are presented for examination.
2. In response to the previous restriction requirement, Applicant elected Group II, which includes claims 4, 6-11, 17-24, 29-31, 35-37 and 42-44 for examination without traverse. However, Applicant argues that claims 5 and 38 are dependent on claims 4 and 37 respectively; they are narrower than the Group II and should not require additional search.

It is noted that Applicant's argument is convincing toward a dependent claim only when its parent claim is in condition for allowance. After carefully reviewing the claim set, the examiner has incorporated claim 5 into Group II because of its similarity to claim 7. However, the exclusion of claim 38 from Group II is maintained because the feature of "assisting recovery of an application's state ..." requires additional search in fault recovery area.

35 USC § 101 Rejection

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

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3. Claims 6, 21, 30, 36 and 43 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Specifically, claims 6, 21, 30, 36 and 43 each recites a computer storage medium configured to perform a method. Even though the method itself has implicit or explicit engagement with computing hardware and/or software, however there is no clear indication as how the computer storage medium is engaged in such computation. The mere statement of "configured to perform" does not necessarily require the storage medium to contain instructions for directing a computer to execute the method steps.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 9-11 are rejected under the first paragraph of 35 U.S.C. 112 for not conveying a concise and exact definition in the term "virtual block allocation structure," which is a critical element in enabling a skilled person in the art to make and use the same, while such definition is not found either in the claim language or in the specification.

5. Claims 4-5 are objected to because of the following issues:

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As to claim 4, it is unclear what is meant by "storing changed logical block numbers" [i.e., (i) storing a logical block pointer pointing to a corresponding data that has been changed or (ii) storing a changing pointer for referencing data elements stored in a logical block?].

For prior art rejection in this office action, the term has been construed as having the meaning of (i). However, clarification is required in response to this office action.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 4-8, 29-31, 35-37 and 42-44 are rejected under 35 U.S.C. 102(e) as being anticipated by Ofek et al.[U.S. Pat. No. 5889935].

8. As to claim 4, Ofek teaches the invention as claimed including: a method for data mirroring, comprising the steps of mirroring data and storing changed logical block

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numbers in a buffer rather than storing changed data in the buffer [e.g., col.17, lines 19-32; col.36, lines 14-65; i.e., the LRU queue (503 of Fig.18) or link queue (504 of Fig. 18) contain only pointers to data (in units of blocks or tracks) in cache. In particular, the transmission link buffer 504 stores only pointers to the cache data (which inherently includes changed or overwritten data) that is to be transferred to a remote storage].

9. As to claim 5, Ofek further teaches that the step of changing a logical block number in place in the buffer to reference data at a second location rather than referencing data at a first location when a block corresponding to the logical block number is overwritten, the first location holding data for the block before the block is overwritten and the second location holding data for the block after the block is overwritten [col.36, lines 48-65; i.e., depending on whether it is in a remote writing or remote reading mode, a pointer can always be efficiently implemented to post-increment or pre-increment its referenced block at a subsequent read/write data element for DMA operation].

10. As to claim 29, Ofek teaches the invention as claimed including: a method for data mirroring, comprising the steps of reading a block of data from a local mirror, writing that block of data to a temporary storage as a new block, updating a logical block number entry in a queue, writing the new block to a collection of mirror data, and adding a new block logical block number entry to the queue [see abstract; col.17, lines 19-32;

col.36, lines 14-65; note that the block data is written into a link buffer 505, while the block's logical number is written into a link transmission queue 504].

11. As to claim 35, Ofek teaches the invention as claimed including: a method for data storage management, comprising the steps of reading data and identifying frequently accessed data elements without prior application-specific knowledge about the order and frequency of storage operations by an application [col.6, lines 29-35; note that by way of a cache the frequently accessed data elements remain in the cache without being affected by the application-specific knowledge about the order and frequency of storage operations because the cache functions on a per CPU read/write operation basis].

12. As to claims 42-44, Ofek teaches the invention as claimed including: a method for data storage management, comprising the steps of reading data and maintaining an ordered queue of mirrored data elements and a current copy of mirrored data elements on the same physical storage system, whereby it is not necessary to write the same data element twice to the storage system to implement a physically partitioned system [note that Ofek's local cache of 228, Fig.18 works toward the mentioned features because of the fact that the link queue (504, Fig.18) maintains the order of data pointers which relate to data elements stored in the link buffer 505. Thus 504 and 505 together maintain a current copy of mirrored data elements on the same physical storage system].

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13. As to claims 6-8, 30-31 and 36-37, since the features of these claims can also be found in claims 4-5, 29 and 35, they are rejected for the same reasons set forth in the rejection of claims 4-5, 29 and 35 above.

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ofek et al.(hereafter "Ofek")[U.S. Pat. No. 5889935], as applied to claims 4-8, 29-31, 35-37 and 42-44 above, further in view of Beal et al.(hereafter "Beal")[U.S. Pat. No. 6237008].

16. As to claim 9, Ofek does not specifically teach that the storing means comprises a virtual block allocation structure.

However, in the same field of endeavor, Beal teaches that the data storage system comprises virtual storage volumes [Beal: Abstract].

It would have been obvious to one of ordinary skill in the art at the time the invention was made that Ofek's storage means could also be constructed as virtual storage volumes because it is well known that a virtual storage system is more robust to changes in storage hardware [Beal: col.1, lines 58-67].

17. As to claims 10-11, Ofek further teaches that the virtual block allocation structure includes block checksums rather than block data in the process of resynchronizing Ofek and Beal' mirrored virtual volumes [e.g., col. 38, line 57- col.39, line 4; i.e., a checksum (CRC) following the transmission of the link queue does not include block data].

18. Claims 17-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sekido [U.S. Pat. No. 6311193].

19. As to claim 17, Sekido teaches the invention substantially as claimed including: a method for data mirroring, comprising the steps of mirroring data, extracting SCSI commands from a bus, and buffering at least one command obtained by the extracting step [Sekido: paragraph 57 and claims 6-7].

Sekido does not specifically teach how to extract SCSI commands from its SCSI bus. However it is well known in literature that for purpose of analyzing a SCSI bus extracting the bus commands by way of passively monitoring the bus has been widely

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used. For example, SCSI analyzer [as is also evidenced by Applicant's specification at paragraph 143] is a tool devised for such purpose.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement Sekido's extracting step by snooping the bus because Sekido's SAN SCSI driver needs to analyze the content of the bus [see step 525 of Fig. 5 and paragraph 57].

20. As to claim 18, Sekido further teaches a step of dividing read nature commands from write nature commands, the read nature commands being requests from a host controller on the snooped bus that are of a read nature, the write nature commands being commands from a host controller on the bus that are of a write nature, and wherein the buffering step buffers write nature commands [Fig.5 and paragraphs 57-59].

21. As to claim 19, Sekido further teaches the step of transferring buffered commands from a first mirroring unit to a second mirroring unit across a communication link [e.g., 565, Fig.5].

22. As to claim 20, Sekido further teaches the step of replaying from a second mirroring unit commands which were buffered by a first mirroring unit [570-575, Fig.5; Fig.6; paragraphs 60-61].

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23. As to claims 21-24, since the features of these claims can also be found in claims 17-18 and 20, they are rejected for the same reasons set forth in the rejection of claims 17-18 and 20 above.

24. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Sugai et al. [U.S. Pat. No. 6571312];

Block et al. [U.S. Pat. No. 5136707];

Nilsen et al. [U.S. Pat. No. 5668986]; and

Bannon et al. [U.S. Pat. No. 5987544].

Conclusion

Examiner note: Examiner has cited particular columns and line numbers in the references as applied to the claims above for the convenience of the applicant.

Although the specified citations are representative of the teachings of the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wen-Tai Lin whose telephone number is (571)272-3969. The examiner can normally be reached on Monday-Friday (8:00-5:00) .

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Follansbee can be reached on (571)272-3964. The fax phone numbers for the organization where this application or proceeding is assigned are as follows:

(703)872-9306 for official communications; and

(571)273-3969 for status inquires draft communication.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Wen-Tai Lin

June 20, 2005

Wen-Tai Lin
6/20/05